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Michael J Petrillo

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595 MINER ROAD
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EXAMINER

SUNG, CHRISTINE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/541,562	Applicant(s) PETRILLO ET AL.	
	Examiner CHRISTINE SUNG	Art Unit 2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-14 and 18-21 is/are rejected.
- 7) ☒ Claim(s) 4, 5 and 15-17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3, 6-14 and 18-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohara (US Patent 6,529,618 B1).

Regarding claim 1, Ohara discloses a radiation detecting apparatus (figure 10) comprising:

an array of elements (Figure 5b) for converting individual received radiation events into corresponding radiation event signals (see array in figure 5b, each detects and converts radiation into signal), one of the radiation converting elements being defective (figure 5b, element P(c,d)= a defective pixel);

a means for digitizing the radiation event signals from at least non-defective elements (element P(c,d) is detected); and

a means for generating radiation event signals for the defective radiation converting element based on the radiation event signals from other radiation converting elements of the

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array (element $P(c,d)$, the defective pixel is corrected via the surrounding pixels, see column 9, lines 16-38).

Regarding claim 2, Ohara discloses that the radiation converting elements each include one of: solid state detector elements, and a scintillation crystal and photodiode pair (column 7, lines 42-53).

Regarding claim 3, Ohara discloses a means for assigning at least two of the individual radiation converting elements of the array as contributing pixels whose output signals are supplied to the defective pixel output signal generating means (see figure 5b, the neighboring pixels to the defective pixels are averaged to correct for the defective pixel).

Regarding claim 6, Ohara discloses that the defective pixel output signal generating means generates output signals for the defective radiation event converting element as a random fraction of events at the contributing radiation event converting elements (Figure 5b, the neighboring pixels are averaged to correct for the defective pixel, therefore a fraction of the surrounding pixel outputs contribute to correct for the defective pixel).

Regarding claim 7, Ohara discloses a means for assigning a radiation energy value to the generated radiation event signals for the defective pixel (figure 5b, the defective pixel is assigned an energy value based upon the average of the surrounding pixels).

Regarding claim 8, Ohara discloses a means for varying the energy output of the energy output means over a pre-selected limited range (the energy output of the defective pixel varies from image to image, as the output of the defective pixel depends upon the average of the surrounding non-defective pixels).

Regarding claim 9, Ohara disclose that the energy varying means includes:

a means for removing a pre-selected number of least significant bits of the energy value (defective pixel energy value is removed from the collected data);

a random number generator for randomly generating least significant bits (the surrounding pixels are averaged and thus generate data with which the discarded data can be replaced);

a means for replacing the removed least significant bits with the randomly generated least significant bits (the energy determined by the surrounding pixels then replaces the discarded data).

Regarding claim 10, Ohara discloses: a means for reconstructing radiation event information into an image representation (see figure 14A, pixels signals are collected and reconstructed into an image);

a means for storing the image representation (See figure 12, element 44);

a means for converting at least a portion of the image representation into a human readable display (see figure 14A, image is displayed).

Regarding claim 11, Ohara discloses a gamma camera comprising:

a two-dimensional array of radiation detector elements (Figure 5B, see two dimensional array of pixel elements) which receive incident gamma radiation events and produce corresponding output signals (Each pixel element receives and converts radiation into electric

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signal), one of the radiation detector elements being defective (element $P(c,d)$ is a defective image pixel);

at least one analog-to-digital converter for converting the element output signals into a digital value indicative of spatial location on the array and energy of the incident gamma radiation event (see figure 11, element 225b, A/D converter to convert the detected radiation); and

a virtual event generator which generates digital output signals for the defective radiation detecting element based on the output signals from other contributing radiation detecting elements of the array (element $P(c,d)$, the defective pixel is corrected via the surrounding pixels, see column 9, lines 16-38).

Regarding claim 12, Ohara discloses a method of detecting radiation comprising:

receiving radiation events at an array of pixilated locations and generating corresponding radiation event signals, at least one of the locations being defective (see figure 11, radiation is detected by an array detector elements, element 222, one of which is defective, see figure 5B, element $P(c,d)$ is defective);

digitizing the radiation event signals from the non-defective locations (Figure 11, element 225, and A/D converter converts the electrical signal to digital signal);

generating radiation event signals for the defective detection location based on the radiation event signals from non-defective locations (See figure 5B, element $P(c,d)$, the defective pixel is corrected via the surrounding pixels, see column 9, lines 16-38).

Regarding claim 13, Ohara discloses:

irradiating the pixilated locations with a flood field of gamma radiation (figure 10, element 10, radiation source for irradiating element 30);

monitoring at least one of the radiation event signals to determine the defective locations (Figure 5B, element P(c,d) = defective pixel location is determined).

Regarding claim 14, Ohara discloses assigning locations adjacent each defective location as contributing pixel locations whose outputs form the basis of the generating of the radiation event signal for the defective location (see figure 5B, pixel elements surrounding defective pixel element P(c,d) are used to correct the defective pixel signal).

Regarding claim 18, Ohara discloses that the radiation event signals are indicative of location (see figure 11, each pixel receives energy and at a given location, see elements DT) and an energy of the received radiation event and further including: randomly varying digital energy values corresponding to the defective pixel locations (the defective pixel data is discarded and replaced by the average of the surrounding pixels in random proportions, see figure 5b, element P(c,d)).

Regarding claim 19, Ohara discloses

removing least significant bits of the digital energy value of the radiation event at the contributing pixel location (defective pixel energy value is removed from the collected data);
and,

assigning randomly generated values as the least significant bits (the surrounding pixels are averaged and thus generate data with which the discarded data can be replaced).

Regarding claim 20, Ohara disclose that the digitized event signal includes array position values indicative of the location in the array that the radiation event was received, and further including:

reconstructing the digital position values into a three-dimensional image representation (see figure 14A, pixels signals are collected and reconstructed into an image); and

converting portions of the image representation into a human readable display (see figure 14A, detected and corrected image is displayed).

Regarding claim 21, Ohara disclose an imaging apparatus comprising:

a detector including an array of elements for converting radiation events into corresponding radiation event signals (figure 11, elements DT make up an array of detector elements, element 222 that detect and convert radiation into electric signal):

a means for determining defective detector elements (see figure 5B, element P(c,d) is a defective pixel that has been determined to be defective); and

a means for generating radiation event signals for defective detector elements, based upon a predefined number of non-defective detector elements proximate said defective detector element (see figure 5B, element P(c,d) the defective pixel, is corrected by averaging the surrounding detector pixel elements).

Allowable Subject Matter

3. Claims 4-5 and 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter:

5. Regarding claim 4, none of the prior art of record specifies or makes obvious a radiation detection apparatus, namely a means for passing a token among the table positions along with a means for receiving the radiation event signals from the contributing radiation converting elements and accessing the table to determine whether the corresponding table position holds the token, in response to the corresponding table position holding the token, generating a radiation event signal for the defective radiation converting element and causing the token passing means to pass the token, in combination with the other claimed elements. Prior art references such as Ohara or Aufrichtig (see pertinent cited references) disclose correcting defective pixel signals by systematically determining which pixel's data is more reliable to apply to a defective pixel (i.e. adjacent to the defective pixel or averaging the outputs of the surrounding pixels, etc.) However, none of the prior art of record randomly assigns a token to a pixel, where the pixel with the token assigned to it is the pixel from which the defective pixel receives its corrective data.

6. Regarding claim 15, none of the prior art of record specifies or makes obvious a method namely the steps of awarding a token to at least one of the contributing pixel locations and in response to receiving a radiation event signal corresponding to a contributing pixel location with the token, generating a radiation event signal for the defective pixel location and transferring the token to another contributing pixel location in combination with the other claimed steps.

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Similarly, none of the prior art of record specifies or makes obvious awarding a token to a contributing pixel and using that pixel's event signal to for a given event then transferring the token or marker to another contributing pixel. Prior art references such as Ohara or Aufrichtig (see pertinent cited references) disclose correcting defective pixel signals by systematically determining which pixel's data is more reliable to apply to a defective pixel (i.e. adjacent to the defective pixel or averaging the outputs of the surrounding pixels, etc.) This determination of which pixel to use is chosen for an intended purpose, i.e. the closest pixel to the defective pixel, or averaging surrounding pixels. In the instant claim the determination of which pixel contributes to the defective pixel is based on which pixel the token now occupies.

7. The balance of claims are allowable for at least the reasons cited above.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

9. US 6792159 A- this reference discloses correcting defective pixels.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTINE SUNG whose telephone number is (571)272-2448.

The examiner can normally be reached on Monday- Friday 9-5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christine Sung/
Primary Examiner
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CS